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cast light on the population of the Mississippi Valley and Atlantic slope of the United States at a date anterior to that of the tribes found there resident by the first explorers. He presents the question temperately and free from the fantastic notions which one generally anticipates in this investigation. His results may be briefly stated.

Beginning with the 'mound builders,' he points out numerous reasons for considering them the immediate ancestors of the present Indians; going further into their identification, he decides that the ancestors of the Cherokees were the mound builders of the Ohio Valley. The original seat of the Huron-Iroquois family he locates north of the Great Lakes, and that of the Algonquian family somewhere to the south of Hudson's Bay, where the Crees are still found speaking a pure and ancient dialect. These two mighty stocks moved slowly southward, driving the mound builders from the Ohio, and penetrating into Virginia. There they met the Dakotas, whom they destroyed, except the small tribes of the Tuteloes and Catawbias. The Gulf States were peopled by the Muskogean tribes from the south-west. The debated question whether there was a 'rough stone' or palæolithic age in the United States, he answers, from the evidence before him, in the negative.

GALTON'S METHOD OF ISOGENS.

MR. GALTON is fertile in the application of new methods to anthropologic data. In a recent article in the *Journal of Statistics* he applies the method in use among meteorologists to define lines of equal barometric pressure, to data of natality. His so-called 'isogens' are analogous to the *isobars* of the weather maps. They are lines of equal birth-rate forming a constant derived from the two variables, the age of the father and that of the mother.

By this ingenious and simple process he reaches some curious results. One is the unexpected law of natality, "That the sums of the ages of the parents are constant; in other words, that the birth-rate is determined by the joint ages of the father and mother. The difference between the ages of the two parents is of no account whatever in nine-tenths of the total number of marriages." Only in the obvious case where the wife is older than the husband and is approaching the limit of the child-bearing age, is this law at fault. Another odd fact developed by this method is that a woman approaching somewhat closely the limit of the child-bearing age, say about thirty-five or thirty-eight, is more fertile with a man of her own age than with one who is younger; though it is admitted certain social reasons may help to this result.

Like all of Mr. Galton's articles, this one will be found admirably presented and well worth study.

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CURRENT NOTES ON PHYSIOGRAPHY (II.).

SIXTH INTERNATIONAL GEOGRAPHICAL CONGRESS.

THE Sixth International Geographical Congress is to be held in London from July 26th to August 3d, 1895, under the auspices of the Royal Geographical Society. An invitation circular has lately been issued, stating the general plan of the Congress, the conditions under which tickets of membership can be obtained, the program of subjects for discussion, and a most comprehensive list of honorary officers, honorary general committeemen, and committees in charge of various divisions of the subject proposed for discussion. An extended exhibit of geographical materials will be held in connection with the Congress, which altogether promises to be a most attractive reunion. The invitation circular can be

had from the Secretary, Royal Geographical Society, 1 Saville Row, London, W. A representative American attendance is highly desirable.

NATIONAL GEOGRAPHIC MONOGRAPHS.

A RECENT number of the 'National Geographical Magazine,' as well as a circular distributed by the American Book Co., New York, announces the early preparation of a series of geographical essays under the above title, prepared by various experts and addressed particularly to the public school teachers of this country. The intention of this series of monographs is to present accurate and properly correlated information upon the geography of our country, in simple, untechnical language, and with good illustrations, in such form that it may be practically useful in supplementing the ordinary teaching of physical geography. They are to help supply the teacher with that background of knowledge that is so essential to good teaching. They will not replace any existing text-books, but in time, as the number of monographs increases, they will certainly be freely drawn on by text-book makers. They deserve prominent mention in *SCIENCE*, for although reduced to as simple form as possible, the names of the authors announced are a guarantee that the monographs will be essentially scientific in character. Their appearance will be watched for with interest.

GEOGRAPHICAL PRIZES.

THE National Geographic Society announces as a subject for a competitive prize essay in 1895: 'The River Systems of the United States.' The essays must not exceed two thousand words in length, and will be received only from those public schools whose intention to compete is announced not later than May, 1895. The essays must be composed entirely by scholars. They must be written by the end of the

school year, 1894-'95, and submitted to the Society not later than July 15th next. The geographical gold medal of the Society will be awarded to the best essayist of the country; the second best will receive a certificate of honorable mention. The best essayist of each State will receive a certificate of proficiency from the committee on awards. This committee consists of General A. W. Greely, Professor T. H. Mendenhall and Superintendent W. B. Powell. Further information concerning the competition may be had from the Society by addressing its Secretary in Washington, D. C.

NEWELL'S REPORT ON AGRICULTURE BY IRRIGATION.

MUCH physiographic material is gathered in the harvest fields of other subjects. A good opportunity for physiographic gleanings is Newell's 'Report on agriculture by irrigation in the western part of the United States at the eleventh census' (1890), recently issued. In California, where irrigation has attained greater importance than in any other State, the advantageous arrangement of the canals and ditches is in many cases peculiarly dependent on the aggraded alluvial fans that the streams from the Sierra have so often built out from their canyons on emerging upon the open valley plain. The fans of Kings and Kern rivers are the best illustrations given of this kind. The abrupt slopes of the San Bernardino mountains in the southern part of the State are cut by deep narrow valleys from which the waste is strewn in great alluvial fans of unusual height and radius. Newell shows these to be of much importance in their relation to agriculture, but, as if to illustrate the backward condition of geographical terminology, and the slow penetration that the few terms already invented make among practical engineers, he calls these well-formed fans by the vague term, 'great masses.' "The debris, con-

sisting of sand, gravel and bowlders, has been piled in great masses at the points where the streams enter upon the lower plains." If it were not for the earlier account of these huge fans by Hilgard (*Bull. Geol. Soc. Amer.*, iii, 1891, 124) they could hardly be recognized here. In Arizona we read that the irrigating streams are largely supplied by rains induced by the enforced ascent of the winds when they encounter the precipitous and ragged fault scarp, where the great plateaus rise out of the lower desert plains. In Idaho a great expanse of dissected country, where the rivers have cut down deep valleys, cannot be irrigated without expensive engineering operations; but farther up the Snake River, "where the streams have not yet succeeded in cutting through the lava," the river water can be distributed over the plain with comparative ease. 'Yet' is a most expressive word for the geographer. The whole report is full of suggestive examples for extract and quotation.

BAYS AND FIORDS REGARDED AS SUBMERGED VALLEYS.

EARLY writers generally ascribed bays and fiords to the destructive action of the sea, or to local dislocation. Esmark, about 1826, was perhaps the first to ascribe much importance to ice as an agent in making the Norwegian fiords; a suggestion that was afterward carried to an extravagant extreme. Dana, on returning from the Wilkes expedition, introduced the idea that fiords are drowned valleys; but whether the erosion of the valleys was done by 'river work alone, or more or less by glaciers,' must be determined by local study. In the present view of the problem, glacial erosion is almost by general consent reduced to a moderate measure; it is chiefly the fiord basins that are now attributed to ice action, while fiord valleys are regarded by nearly all observers as of preglacial origin as ordi-

nary land valleys, afterwards submerged. Bays, like Chesapeake and Narragansett, are commonly regarded as resulting from the submergence of wide river valleys, modified by glacial erosion or deposition, if in glaciated regions. This modern view is lately reënforced in an article by Professor Shaler (*Evidences as to change of sea level*, *Bull. Geol. Soc. Amer.*, vi., 1885, 141-166), in which various reëntnants of our coast, such as Chesapeake and Narragansett bays, the fiords of Maine, and the numerous depressions which break the northern part of the continent into a group of islands, are all ascribed wholly or chiefly to the submergence of stream-worn lands. The general problem of submergence seems, however, hardly so simple as 'to indicate a progressive subsidence of a somewhat uniform nature' along the Atlantic coast from Mexico to near the pole. The possibility of numerous subordinate and discordant oscillations in different parts of the coast is wide open; and while in a general way it may be said that our eastern coast has been depressed, it does not follow that the depression was synchronous throughout, as it must have been if its cause were a movement of the sea floor; hence a preference for this 'hypothesis of Strabo' hardly seems warranted. The submergence of our southern coast may now be going on, while the northern coast may be at present rising, but not risen enough to correct an earlier and greater submergence. This would make diverse continental movements the essential cause, and displacement of the sea floor only secondary.

GEOLOGIC ATLAS OF THE UNITED STATES.

ALTHOUGH primarily of geological interest, the several folios of this great atlas now issued are important to geographers from the accurate and succinct accounts that they give of topographical features. The topographical sheets alone are very instructive; but their value is greatly increased when

accompanied by explanations that have been prepared by trained observers who have been all over the ground, examining the forms of the surface as the expressions of internal structures. From the sheets in eastern Tennessee we may learn of the two peneplains that there give local illustration of wide-spread Appalachian forms. On the Livingston sheet, Montana, there is a fine illustration of one of the many extinct lake basins now drained through a steep-walled gorge, in a way so characteristic of the northern Rocky Mountains. With the Placerville sheet, in the California Sierra, the text tells of the reduction of the mountain belt to gentle slopes before the eruption of the great Neocene lava flows by which many of the older valleys were broadly filled; and of the deep canyons cut by the displaced rivers since the mountain belt has been upheaved with a westward slant. The plan of liberal distribution of these folios ensures that they will reach a wide variety of readers. They will be welcomed by many workers: students, teachers and investigators; geographers, geologists and economists.

GEIKIE'S GREAT ICE AGE.

THE third edition of this important work has been lately issued (New York, Appleton, 1895). Although distinctly a geological treatise, not written from the geographical point of view, it contains numerous pages of physiographic interest, for many glacial deposits are so young as still to preserve essentially their constructional form; hence the account of moraines, drumlins, rock-basins, and so on, are of immediate geographical value. The general subject of glacial erosion is hardly treated with the fulness that the many discussions it has given rise to would warrant; and the explanation of rock-basins does scanty justice to the opinions of many Swiss geologists who look on ice action as a secondary process compared to a gentle warping of pre-

existent valleys. The extract from Wallace's paper, defending the glacial excavation of rock-basins, would imply that that author was not acquainted with the numerous lakes of dislocation in our western territory. For American readers the two chapters and the several maps by Chamberlin will prove attractive.

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LABORATORY TEACHING OF LARGE CLASSES—ZOOLOGY.*

IF the large and increasing attendance at our summer schools, and the publication of many books and the reports made by those dealing in scientific apparatus, can be taken as an index, the amount of zoological teaching is very rapidly increasing, and the conduction of large classes is a problem of considerable importance.

A class of college students numbering twenty or twenty-five, and conducted by one officer, is a large class and, even with a favorably equipped laboratory, is quite as large as a single teacher should attempt to carry. Of course, if a certain number of assistants can be engaged, a larger number of students can be directed, though this is virtually the establishment of so many sub-classes.

One of the first conditions for successful zoological instruction is that of immediate environment. To crowd a score or more of katabolic youth into a small, miserably-lighted room, and compel them to breathe the fumes of stale alcohol for two or three hours, is to invite failure. Each student should have a table to himself where there is good light, and where he feels a certain amount of proprietorship. It should be so located that he is not tempted to carry on a clandestine parasitism, or even a symbiotic

* A paper read before the American Society of Naturalists at the Baltimore meeting, December 28, 1894.